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Proceedings of the Maritime Provinces Regional Advisory Process on Banquereau Bank Arctic Surfclam and Sable Bank and St. Mary's Bay Ocean Quahog Assessment

20 April 2007
Bedford Institute of Oceanography
Dartmouth, N.S.

Robert O'Boyle
Meeting Chair

Bedford Institute of Oceanography
1 Challenger Drive, P.O. Box 1006
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June 2007

Compte rendu de la réunion du Processus consultatif scientifique des provinces Maritimes sur l'évaluation de la mactre de Stimpson du Banquereau et du quahog nordique du banc de l'île de Sable et de la baie St. Mary's

le 20 avril 2007
Institut océanographique de Bedford
Dartmouth (N.-É.)

Robert O'Boyle
Président de réunion

Institut océanographique de Bedford
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Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings include research recommendations, uncertainties, and the rationale for decisions made by the meeting. Proceedings also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

Avant-propos

Le présent compte rendu a pour but de documenter les principales activités et discussions qui ont eu lieu au cours de la réunion. Il contient des recommandations sur les recherches à effectuer, traite des incertitudes et expose les motifs ayant mené à la prise de décisions pendant la réunion. En outre, il fait état de données, d'analyses ou d'interprétations passées en revue et rejetées pour des raisons scientifiques, en donnant la raison du rejet. Bien que les interprétations et les opinions contenus dans le présent rapport puissent être inexacts ou propres à induire en erreur, ils sont quand même reproduits aussi fidèlement que possible afin de refléter les échanges tenus au cours de la réunion. Ainsi, aucune partie de ce rapport ne doit être considéré en tant que reflet des conclusions de la réunion, à moins d'indication précise en ce sens. De plus, un examen ultérieur de la question pourrait entraîner des changements aux conclusions, notamment si l'information supplémentaire pertinente, non disponible au moment de la réunion, est fournie par la suite. Finalement, dans les rares cas où des opinions divergentes sont exprimées officiellement, celles-ci sont également consignées dans les annexes du compte rendu.

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SUMMARY

The Maritime Provinces Regional Advisory Process (RAP) review of the framework for the assessment and management strategy for Banquereau Bank Arctic surfclam and ocean quahogs on Sable Bank and in St. Mary's Bay was completed in early April 2007. The framework provided advice on the appropriate data and methodology for the assessment and recommendations to the Department of Fisheries and Oceans (DFO) Fisheries and Aquaculture Management Branch (FAM) on the exploitation of these stocks. At a meeting on 20 April 2007, the framework was applied for the first time to provide the assessment in support of the fishery.

SOMMAIRE

L'examen du cadre applicable à l'évaluation et à la stratégie de gestion de la mactre de Stimpson du Banquereau et du quahog nordique du banc de l'île de Sable et de la baie St. Mary's a été terminé au début d'avril 2007. Il a permis de formuler un avis sur les données et les méthodes pertinentes à employer pour évaluer les stocks susmentionnés et pour faire des recommandations sur leur exploitation aux gestionnaires des pêches. À une réunion tenue le 20 avril 2007, le cadre a été appliqué pour la première fois à l'évaluation effectuée à l'appui de la pêche.

INTRODUCTION

There has been a quota regulated fishery on Banquereau Bank Arctic surfclam since 1986 (DFO 2005b). A total allowable catch (TAC) was established for Sable Bank ocean quahog in 2003, but this was not fished. There has been no fishery for St. Mary's Bay ocean quahog. An Expert Opinion (EO) on the habitat implications of a Clearwater/Deep Sea Clam Ocean Quahog Development Proposal was produced (DFO 2002), as was an Expert Opinion on the rationale for ocean quahog harvest advice (DFO 2005a).

Recently, in collaboration with DFO, the fishing industry initiated a survey program for the Banquereau Bank Arctic surfclam and Sable Bank ocean quahog resources. The most recent surveys were carried out on Sable Bank in 2003 and on Banquereau Bank in 2004.

There are signs of a potential increase in effort in the fishery in these areas. This was the stimulus for the current scientific review and provision of advice on harvesting strategies for hard-shelled clams.

A framework for the assessment and management strategy for Banquereau Bank Arctic surfclam and ocean quahog on Sable Bank and in St. Mary's Bay was completed in early April 2007. The framework provided advice on the appropriate data and methodology for the assessment, and recommendations to DFO Fisheries and Aquaculture Management on the exploitation of these stocks. At a meeting on 20 April 2007, the framework was applied for the first time to provide the assessment in support of the 2007/08 fishery.

The meeting commenced with the Chair, Robert O'Boyle, welcoming the participants. He particularly noted the presence of Dr. Robert Mohn and Susanna Fuller, who were the invited scientific reviewers for the meeting. The context and overall process of the assessment, as outlined in the Terms of Reference, were then presented. Following this, there was a discussion on the objectives of this meeting; which focused on applying the accepted framework to the data for use in generating advice for management of the fishery.

The objectives of this meeting are provided in the Terms of Reference (Appendix 1). The Agenda and List of Participants are provided in Appendices 2 and 3, respectively.

The Chair noted that all of the working papers, Expert Opinion documents, and draft Science Advisory Report (SAR) were available at the back of the room.

After thanking Paul Boudreau, the meeting rapporteur, the presentations commenced.

SUMMARY OF PRESENTATIONS

Review of the 2007 Assessment and Management Strategy Framework for Banquereau Arctic Surfclam and Ocean Quahogs on Sable Bank and in St. Mary's Bay

Presentation Highlights

There were three short presentations summarizing the information, discussions, and conclusions from the Maritime Provinces Regional Advisory Process on Assessment and Management Strategy Framework for Banquereau Arctic Surfclam and Ocean Quahogs on Sable Bank and in St. Mary's Bay (DFO 2007).

Dale Roddick provided a presentation on the summary of the data inputs and information available for use in the assessment (Roddick *et al.* 2007a, Roddick *et al.* 2007b, Roddick *et al.* 2007c, and Roddick *et al.* 2007d).

Ian Jonsen presented a summary of the information on catch per unit effort (CPUE) analysis that was used in evaluating this information in conducting the assessment (Jonsen 2007).

Derek Fenton presented a summary of the information on the impacts of clam dredges on the benthos.

Discussion

Based on the information presented, there does not appear to be evidence of growth overfishing nor recruitment overfishing, as a large portion of the clams are maturing before being recruited to the fishery. It was pointed out that the generation time based on M is 88 years. This may indicate a problem with estimate of natural mortality.

Attempts had been made to include the estimate of 15% incidental fishery mortality of small clams that do not get harvested to the boat. The incidental mortality and the selectivity curves need to be adjusted to improve the modelling results to better reflect the knowledge we have of the fishery.

It was pointed out that other bivalves have higher growth in the gonads than in the somatic tissue and this might affect the stock spawning biomass (SSB) curves.

The industry does not presently catch the total allowable catch (TAC) because of vessel availability and marketing.

There will be difficulties in applying the accepted framework in St. Mary's Bay. The framework uses the biomass as estimated from the most recent research surveys. In St. Mary's Bay, there is no commitment to carry out any additional surveys, and so it is recognized that the best available information for St. Mary's Bay would be based on the 2002 survey, and may be somewhat out of date, for the purposes of making recommendations on the TAC.

The area swept by the clam dredges on Banquereau Bank in 2005 and 2006 was estimated as 256 km^2. This area amounts to about 5% of the total clam habitat on the bank that has been impacted in the preceding two years. This was accepted as the area of re-colonization by non-target species, as can be understood in relation to the results of a recent research study (Gilkinson *et al.* 2005). Initial results from this work have shown that the area impacted recovers within a couple of years to the same species composition, but at somewhat lower levels of

density. It was pointed out that the study area was only marginal clam habitat in deeper water, as the study attempted to identify and work on an area that had not been previously fished. It is unknown how representative these results would be for recovery in prime clam habitat on the shallower and more energetic waters of the bank.

Since the beginning of fishing activity, it is estimated that 2,223 km^2 area has been swept. This area swept calculation does not include a correction for the overlap of the trawls that could be quite high. Nevertheless, it is only a relatively small proportion of the total 9,229 km^2 of clam habitat in the area.

It was suggested that maybe there is purpose in doing an estimate of the area impacted on sub-areas of Banquereau Bank. This may be helpful in identifying the intensity and the "time since impact" for specific areas of the bank that have been trawled. Based on the analysis of Jonsen (2007), it is unlikely that the data exists to carry out this more detailed spatial analysis.

In summary, it was agreed that the area dragged would provide a metric for estimating impact and recover on the scale of the overall bank. From the research results, there is an estimate of two-year processes of recovery for non-target following dredging. For the target species, the recovery takes longer. It was agreed that the analysis presented was very preliminary and should be presented in qualitative sense.

There was also a discussion on whether re-colonization starts immediately after the dredging activities, and if there is anything known about the timing of the re-colonization processes. This relates to the understanding of the recruitment of the target species. There is evidence of sub-areas on the bank having a high percentage of small organisms. This may reflect the result of recruitment pulses with single age classes settling in one area. There are also observations of areas that are well mixed in the size composition. It is unknown how growth rates may be varying in the different sub-areas of the bank, or how this might be reflected in the size compositions of the different areas. There is evidence that one area has undergone a single strong recruitment pulse over a 10-15 year time period (DFO 2007).

It is unclear whether the observed variability in time and space of size composition is the result of variability in the release of gametes or in the success of settlement of larvae.

Science Advisory Report (SAR)

Discussion

It was agreed that the SAR would be reviewed section by section. There were numerous comments made on specific changes required in the SAR. These were to be noted by the author and incorporated in the next draft of the SAR that would be presented to the editorial board.

The notes that follow attempt to document larger points of discussion and agreement.

General Overview

The recommended order for dealing with stocks/areas within the SAR should be to highlight the presently commercial fisheries. Thus, the document should attempt to deal with subjects in the following order:

- Arctic surfclams on Banquereau Bank;

- Ocean quahogs on Sable Bank; and,
- Ocean quahogs in St. Mary's Bay.

Species Biology

It was pointed out that there needs to be a sentence added to point out the understanding that there is a lot of spatial structure in the various biological processes, such as larval settlement, organism growth, and density of animals. Unfortunately, there is little is known about the specific details of the biology of the organisms that gives rise to differences between the sub-areas on the bank where there have been observed areas with primarily small organisms and one area that was seen to have had a strong pulse of recruitment over a 10-15 year time period.

Assessment

It is important to state why the fisheries dependent information, i.e., CPUE, is not used for assessment. Jonsen (2007) suggests that the catch rates are not well correlated to the stock abundance due to the spatial distribution of the stock, the selectivity of the area fished by the fishery, and the low spatial resolution of the effort data. As a result, the research survey information was accepted as the best basis for recommending harvest levels.

It should be pointed out that the estimate of fishable biomass can be arrived at from the research survey due to the high selectivity and efficiency of the gear.

The 95% confidence interval (CI) limits should be included when presenting estimates of biomass in the document.

Harvest Rules

In the table of TAC, it is not necessary to include the top three lines as they are beyond the range agreed at the Framework meeting. $F_{0.35}$ is about equal to MCY in the table, and so the table should only show F at MCY.

It is important to include a statement that the F level recommended should be linked with the frequency of surveys. If there are more frequent surveys, then the science advice can be less conservative and thus a higher level of F can be considered. More frequent surveys would do a better job at tracking changes in the stock that would allow adjustment to management actions. Science advice for the St. Mary's Bay would have to be more conservative as there are no surveys planned.

At present, there are significant unknowns about the biological processes of the stock. As a result, a conservative F level should be recommended at this time. The level of risk is unknown but would increase with relatively higher levels of F.

Based on the framework advice to use the research survey biomass in providing science advice, it is important to note that there would be no response from Science to a request from managers for changes in TAC in the event that there was no survey.

It is important to note that for the present usage, the term MCY relates to the research vessel biomass, rather than the classical definition that relates to the virgin biomass of the population.

At present, there are no other control rules recommended at this time.

Additional Stakeholder Perspectives

It was agreed that this section would be dropped and the material redistributed to other sections of the document.

The discussion on the interactions between the fishery and the offshore petroleum activities would be placed in the section entitled "Other Considerations". The points on by-catch should be moved to the "Habitat/Environmental Consideration" section.

Habitat/Ecosystem Considerations

Arctic surfclams make up 80% of the catch. By-catch in the Banquereau fishery has been seen to be low and does not appear to be a concern. On average, the percent by-catch by mass is 20%, including shell and stones. There are no concerns about species at risk in this fishery and thus is not considered an issue. There was a discussion on the possibility of thorny skate in the by-catch. This should be recognized in the SAR as being an unknown due to the misidentification of skate from the observer data. It is expected to be relatively low, but the authors were asked to double check the contents of the table on catch to confirm that it considers finfish.

Future science advice will need to include recommendations for the Sable Bank area. It was noted that in comparison to Banquereau Bank, research results have shown that the Sable Bank area undergoes faster recovery due to the shallow depths and increased wave and current energy.

Similar and/or better monitoring approaches should be used on Sable Bank to track the area impacted and the possible state of recovery. With some consideration of depths and species composition, the information on recovery collected from the Banquereau Bank experiment may be applicable to Sable Bank and other similar sandy environments.

Sources of Uncertainty

There are a number of uncertainties for this stock. These include recruitment, life history parameters, spatial distribution of the resource, and growth trends over time and space. There were also concerns about the lack of detailed information on the spatially distribution of the CPUE. As a result, science advice should be conservative.

Although the survey is considered to be accurate with high sampling intensity, there may be a bias due to the unknown catchability/dredge efficiency.

Other Considerations

No comments.

Management Considerations

No comments.

CONCLUDING REMARKS

In concluding the discussion, it was agreed that the authors would make changes to the draft SAR based on the comments made at this meeting. This next draft would be circulated to participants no later than 25 April 2007, and for comment no later than 27 April 2007. Based on the judgement of the Chair, if there are no substantive issues outstanding as a result of the April 27th review, the SAR would then be forwarded to the editorial board for finalization. If there are substantive issues identified in the comments from participants, a conference call of meeting participants would be scheduled during the week of 30 April 2007, to come to an agreement on the SAR. Participants agreed to these conditions.

The Chair confirmed that the draft proceedings would be circulated for review and comment before being finalized. This was accepted by the participants.

The Chair then thanked all the participants and closed the meeting.

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Appendix 1. Terms of Reference

Maritime Provinces Regional Advisory Process
on Banquereau Bank Arctic Surfclam and
Sable Bank and St. Mary's Bay Ocean Quahog Assessment

20 April 2007

Hayes Boardroom
Bedford Institute of Oceanography
Dartmouth, Nova Scotia

Terms of Reference

Context

There has been a quota regulated fishery on Banquereau Bank Arctic surfclam since 1986, although there has not been an assessment framework developed and advice has been provided by Science to Fisheries and Aquaculture Management on an as-needed basis. A total allowable catch (TAC) was established for Sable Bank ocean quahog in 2003, but this was not fished. There has been no fishery for St. Mary's Bay ocean quahog.

A review of the assessment framework for these resources was undertaken during 17-18 January and 4–5 April 2007. The current assessment will apply the results of this review in support of management during the current assessment period.

Objectives

- Provide recommended harvesting strategies/approaches, including the consequences of different harvest levels of Banquereau Arctic surfclams and ocean quahogs on Sable Island Bank and in St. Mary's Bay, until the next framework review.

- As far as possible, provide similar recommendations for other related hard-shelled clam stocks throughout the Maritimes Region.

Outputs

CSAS Science Advisory Report
CSAS Research Document
CSAS Proceedings

Participation

Scientific experts from within DFO
Industry knowledgeable in clam fisheries
Fisheries managers

Appendix 2. Agenda

Maritime Provinces Regional Advisory Process
on Banquereau Bank Arctic Surfclam and
Sable Bank and St. Mary's Bay Ocean Quahog Assessment

20 April 2007

Hayes Boardroom
Bedford Institute of Oceanography
Dartmouth, Nova Scotia

PROPOSED AGENDA

20 April 2007 - Friday

09:00 – 09:15	Welcome and Introduction (Chair)
09:15 – 12:00	Presentation of assessment (Framework working papers with minor updates)
10:00 – 10:15	Health break
09:15 – 12:00	Continuation of presentation of assessment
12:00 – 13:00	Lunch
13:00 – 17:00	Review of draft Science Advisory Report
15:00 – 15:15	Break
13:00 – 17:00	Continuation of review of draft Science Advisory Report (SAR)
17:00	Adjournment

Appendix 3. List of Participants

Maritime Provinces Regional Advisory Process
on Banquereau Bank Arctic Surfclam and
Sable Bank and St. Mary's Bay Ocean Quahog Assessment

20 April 2007

Hayes Boardroom
Bedford Institute of Oceanography
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